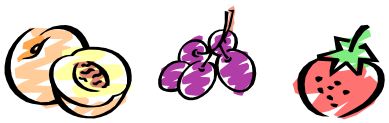


With this guide you will gain quick and easy knowledge on a wide variety of fruits and vegetables that all clerks should know and customers should ask. In addition, you will be exposed to the basic information necessary to assure the quality and safety of the produce you sell. Our goal is to maintain the highest level of safety for consumers while promoting the sale of fresh produce for better health.

The individualized produce pages give an overview of how to store and handle various fruits and vegetables. In addition to the unique but important considerations for each commodity, check marks indicate basic recommended storage tips to abide by.

A note on the photos:

Understanding when fruits and vegetables are "still good" to be sold is largely based on their outside appearance. There are two photos per commodity page.

- **First Photo**: The closest to if not the best condition to sell
- **Second Photo**: Must be discarded. Is unhealthy for consumers and can cause cross contamination with other produce.

Handling, Storage and Display

Each fruit and vegetable has special needs in terms of handling, storage and display. For specific fruit and vegetables, please refer to the individual produce fact sheets. Here are some basics:

- Certain produce requires more handling care than others
- Refrigeration temperature and placement varies on the fruit or vegetable
- Mixing certain fruits and vegetables can lead to over-ripening
- If it looks bad, it probably is! Discard to prevent cross-contamination
- Quality and freshness can be prolonged by following a few simple steps

Temperature

The temperatures presented per page are the **optimal** (the best) storage temperatures for each commodity. It is important to pay attention to which commodities need immediate and constant refrigeration and which ones do not. While most require a cool environment at low temperatures, **freezing** fruits and vegetables is **not** recommended. Many commodities have optimal temperatures that we know as a "freezing point" (0°C or 32°F). Due to the varying, organic make up fruits and vegetables, freezing temperatures differ per commodity. While refrigeration is one of the best methods of storage, it also slowly causes moisture

loss (dryness) to fruits and vegetables. If possible, keep commodities that lose moisture quickly in areas equipped with special humidifying functions. Pay attention to temperature considerations and come as close as your facility will accommodate, especially for storage purposes.

Handling

Generally, most produce is fragile and requires careful handling. It is usually not a good idea to throw, toss or stack commodities, as it can cause bruising and other physical damage. Also note that non-visible damage can occur under the skin of some fruits and vegetables. Along with visible physical damage, rough handling leads to the deterioration of the commodity, making it unfit to sell or consume.

Storage

The most important step in keeping produce healthy is by storing it in the right temperature. For those commodities not requiring refrigeration, the storage area should have good air circulation. Do not store produce in stuffy areas.
It is generally not a good idea to store commodities on the floor, especially when wet. This can contribute to mold and affect the safety and quality of the commodity. Other areas that are not acceptable for food storage including produce include the following areas, as noted in chapter 3 of the 2001 Food Code (sponsored by the Food and Drug Administration):

- Locker, toilet, garbage, mechanical rooms;
- Under sewer or water lines; areas where water can drip/leak
- Under stairwells
- Other areas that can cause contamination

When produce shipments arrive, they should be unpacked and stored immediately; do not wait to unload and store.

Display

An important issue to consider is **when** to discard bad produce. Make it a priority to check produce on display **daily**. If it looks bad or rotten, or if there are any doubts, discard it. The display area itself should be cleaned often. This includes the bins, containers, and racks used for the commodities. Also included are the refrigerators that display commodities other than produce. Use the rule of “First in, First out” when putting commodities out to sell.

A note on ethylene…

Ethylene is a natural chemical found in some fruits and vegetables. It stimulates ripening and can add to over-ripening in some produce. Commodities that generate high amounts can actually affect other nearby produce. *Please note that ethylene affects **packaged** and **non-packaged** fruit and vegetables the same.* This is why it is important to recognize which commodities generate high amounts and which ones are sensitive to it and separate accordingly in storage and display.

Commodity	Produces Ethylene	Sensitive to Ethylene
Apples	Yes; High	Yes
Banana	Yes; Low	Yes
Chiles	Yes; Low	Yes
Eggplant	Yes; Low	Yes
Garlic	Yes; Low	No
Grapefruit	Yes; Low	Yes
Head of Cabbage	Yes; Low	Yes
Head of Lettuce	Yes; Low	Yes
Mushrooms	Yes; Low	Yes
Nectarines	Yes; High	Yes
Onion	Yes; Low	No
Oranges	Yes; Low	Yes
Packaged Cut Cabbage	Yes; Low	Yes
Packaged Salad	Yes; Low	Yes
Pears	Yes, High	Yes
Squash	Yes; Low	Yes
Strawberries	Yes; Low	No
Tomatillos	Yes; Low	No
Tomatoes	Yes; moderate	Yes
Whole Pineapples	Yes; moderate	No
Whole Watermelon	Yes; Low	Yes

Special Handing, Storage, and Display Consideration: Packaged Fruits and Vegetables

Packaged fruits and vegetables offer a convenience to the consumer and seemingly less responsibility for the store clerk. However, they actually require special handling, storage and display considerations. Damage to one piece due to improper handling, storage and display can affect the others resulting in faster spoilage of the whole bag. It is important to scan packages and discard those that have rotten pieces. Rotten pieces of produce can also become the new home of insect larvae and pathogens (i.e. bacteria, fungus), which can be harmful if consumed.

Personal Health Issues

Hand washing, and Basic Hygiene

Hand washing

Hand washing, if done correctly, is a quick and simple way to help ensure the quality and integrity of the produce offered. Inform employees on the importance of hand washing.

Different hand washing methods have varying levels of effectiveness in removing bacteria and viruses. The **least effective method** is rinsing hands in water. The **best method** involves rubbing hands together with soap lather and warm water for 20 seconds—the time it takes to sing Happy Birthday twice. Then wipe clean with a paper towel. Cloth towels retain bacteria from the previous hand wash*.

Wash your hands after:

- Blowing your nose
- Coughing
- Sneezing (cover your mouth!)
- Touching an infected area on your body
- Eating
- Drinking
- Smoking
- Touching the floor, money, trash containers, etc.

Hygiene

Taking care of ourselves and appearance contributes to an overall healthy work environment. In addition to hand washing, there are other simple steps that can be taken to ensure better health and produce handling.

- If you have any **open wounds** or other **skin abrasions**, use protective gloves **and** band-aids. Infection causes food contamination and other health risks
- If you touch your wound, wash your hands!
- Do not chew gum
- Keep your hair back
- Wear clean clothes and keep a neat appearance

*Hand washing information used with permission from the Iowa State University Hotel, Restaurant and Institution Management Extension

Additional Information

The University of California, Davis offers a comprehensive site devoted to post-harvest handling and storage of fruits and vegetables. Individualized commodity pages give additional information per commodity. Information available also includes Spanish language materials.

http://postharvest.ucdavis.edu/Produce/Producefacts/index.shtml

Sponsored by the United States Department of Agriculture, this link provides a variety of information ranging from individualized commodity pages to issues regarding grocery store display storage and food safety.

http://www.ba.ars.usda.gov/hb66/contents.html

Developed by the National Sustainable Agriculture Information Service, the site offers detailed information relating to storage and handling of post harvest commodities. Of particular interest to a retailer is the section on which fruits and vegetables can/cannot be iced for storage.

http://attra.ncat.org/attra-pub/postharvest.html#postharvest

The Produce Marketing Association is a not-for-profit global trade association serving more than 2,100 members who market fresh fruits, vegetables, and related products worldwide. Its members are involved in the production, distribution, retail, and foodservice sectors of the industry. Free resources available.

http://www.pma.com

Created by the Partnership for Food Safety Education, the link provides basic information on food safety and handling to prevent bacteria and food borne illnesses. Included are free downloads and information in Spanish; also offers additional links.

http://www.fightbac.org/main.cfm

While geared primarily towards on the farm produce handling, this article offers great information relating to produce handling in any setting. Sponsored by Iowa State University Hotel, Restaurant and Institution Management Extension.

http://www.extension.iastate.edu/Publications/PM1974B.pdf

Chapter 3 of the 2001 Food Code updated 2004, gives information relating to various aspects of food safety. In partnership with the Center for Food Safety and Applied Nutrition.

http://www.cfsan.fda.gov

Apple

YES	NO	
☑	☐	REFRIGERATION
☑	☐	TEMPERATURE 0-1°C (32-34°F)

GOOD

BAD

Storage/Display

- Do not stack
- Sensitive to ethylene; Keep away from moderate to high ethylene producing fruit/vegetables
- Separate from heavier items
- Cooling recommended upon arrival
- Loss of moisture/water loss can lead to shriveling

Handling

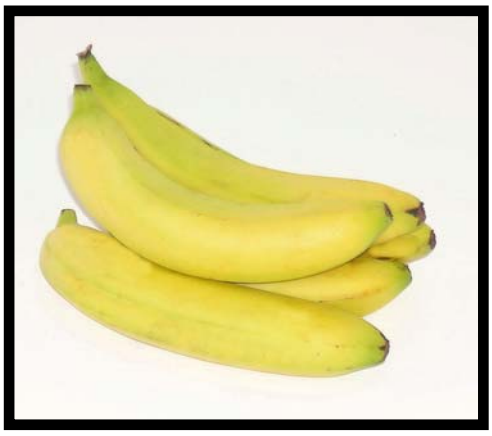
- Apples bruise easily; Handle carefully
- Do not drop; toss, roll

Basic Info

- Should be free from decay and cuts
- Look for firm, shiny skin
- Apples are one of the highest ethylene producers

Banana

YES	NO	
☐	☑	REFRIGERATION
☑	☐	TEMPERATURE 13-14°C (56-58°F)



GOOD

BAD

Storage/Display

- Do not stack
- Sensitive to ethylene; Keep away from moderate to high ethylene producing fruit/vegetables
- Separate from heavier items

Handling

- Bananas bruise easily; Handle carefully
- Do not drop; toss, roll

Basic Info

- Should have a full shape and be even in color
- Some brown spots are ok; Darker, more frequent spots indicate rotting flesh

Head of Cabbage

YES	NO	
☑	☐	REFRIGERATION
☑	☐	TEMPERATURE 0°C – (32°F)

GOOD

BAD

Storage/Display

- Do not stack
- Sensitive to ethylene; Keep away from moderate to high ethylene producing fruit/vegetables
- Separate from heavier items
- Keep cool; Do not freeze

Handling

- Cabbage is fragile; Handle carefully
- Do not drop; toss, roll
- Do not tear outer sheath; this keeps moisture in

Basic Info

- Head should be solid and free from decay
- Outside leaves protect inside quality of cabbage

Chiles

YES	NO	
☑	☐	**REFRIGERATION** (For non-dried chiles)
☑	☐	**TEMPERATURE** 7-13°C (45-55°F)

Pasilla

Serrano

GOOD

Storage/Display

- Store away from drafts, including cool and warm air; This leads to shriveling
- Keep away from ethylene producing fruit/vegetables
- Separate from heavier items

Pasilla

Serrano

BAD

Handling

- Handle carefully; Chiles bruise easily
- Bruising can lead to soft spots; Soft spots indicate poor quality
- Do not drop; toss, roll

Basic Info

- Dry lines and striations on skin = hotter pepper; NOT poor quality
- Avoid shriveled or decayed peppers
- Should be firm with bright shiny skin

Garlic

YES	NO	
☐	☑	REFRIGERATION
☑	☐	TEMPERATURE 20-30°C (68-86°F)

GOOD

BAD

Storage/Display

- Garlic odor can be transferred; Store separately
- Keep dry; Moisture spoils garlic
- Can bruise other commodities
- Not sensitive to ethylene
- Keep in area with good air ventilation and circulation

Handling

- Do not drop; toss, roll
- Do not separate cloves

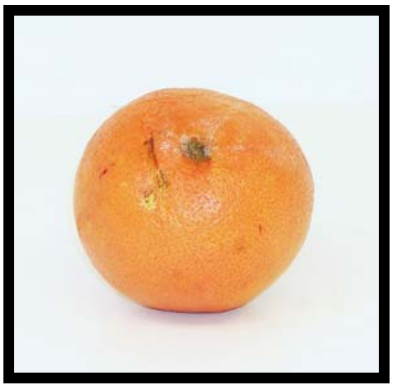
Basic Info

- Powdery patches under skin indicates decay
- Discard shriveled and soft bulbs

Grapefruit

YES	NO	
☐	☑	REFRIGERATION
☑	☐	TEMPERATURE 12-14 °C (54-57°F)

GOOD



BAD

Storage/Display

- Do not stack
- Sensitive to ethylene; Keep away from moderate to high ethylene producing fruit/vegetables
- Separate from heavier items

Handling

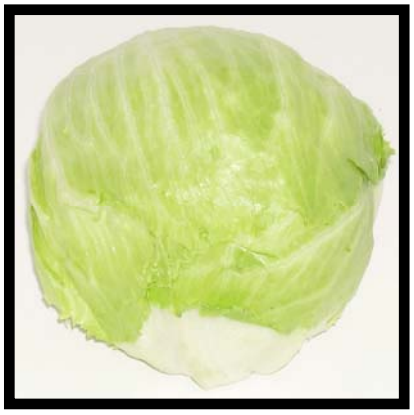
- Grapefruits bruise easily; Handle carefully
- Do not drop; toss, roll

Basic Info

- Look for firm, round grapefruit with shiny skin
- Discard heavily bruised or damaged grapefruits

Head of Lettuce

YES	NO	
☑	☐	REFRIGERATION
☑	☐	TEMPERATURE 0-5°C (32-41°F)



GOOD

BAD

Storage/Display

- Do not stack
- Sensitive to ethylene; Keep away from moderate to high ethylene producing fruit/vegetables
- Separate from heavier items
- Keep cool; Do not freeze

Handling

- Lettuce is fragile; Handle carefully
- Do not drop; toss, roll
- Do not tear outer sheath; this keeps moisture in

Basic Info

- Head should be solid and free from decay
- Lettuce deteriorates quickly as temperatures rise

Mushroom

YES	NO	
☑	☐	REFRIGERATION
☑	☐	TEMPERATURE 0-1.5°C (32-35°F)

GOOD

BAD

Storage/Display

- Must be kept cool at ALL times
- Keep away from commodities with strong odors
- Sensitive to ethylene; Keep away from moderate to high ethylene producing fruit/vegetables
- Separate from heavier items

Handling

- Mushrooms bruise easily; Handle carefully
- Do not drop; toss, roll

Basic Info

- Discard moldy, slimey, and deteriorated mushrooms

Nectarine

YES	NO	
☑	☐	REFRIGERATION
☑	☐	TEMPERATURE -1-0°C (30.5-32°F)

GOOD

BAD

Storage/Display

- Do not stack
- Separate from heavier items
- Rapid cooling recommended upon arrival
- loss of moisture/water loss can lead to shriveling

Handling

- Nectarines bruise easily; Handle carefully
- Do not drop; toss, roll

Basic Info

- Should have firm and smooth skin
- Remove and discard damaged nectarines

Onions

YES	NO	
☑	☐	REFRIGERATION
☑	☐	TEMPERATURE -1-0°C (30.5-32°F)

GOOD

BAD

Storage/Display

- Do not stack
- Separate from heavier items
- Store in dry area with good ventilation

Handling

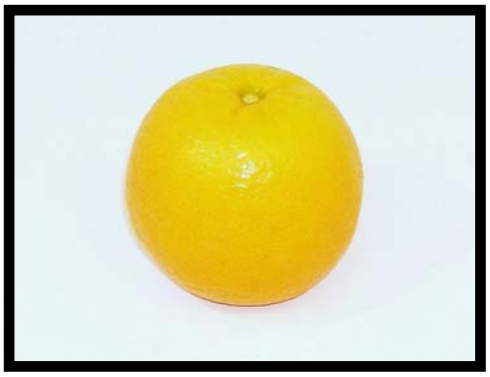
- Onions bruise easily; Handle carefully
- Do not drop; toss, roll

Basic Info

- An onion's strong odor can be absorbed by other fruit and vegetables
- Remove and discard damaged onions

Orange

YES	NO	
☑	☐	REFRIGERATION
☑	☐	TEMPERATURE 3-8°C (38-46°F)



GOOD

BAD

Storage/Display

- Keep in well ventilated areas
- Produces a strong odor
- Sensitive to ethylene; Keep away from moderate to high ethylene producing fruit/vegetables
- Separate from heavier items

Handling

- Oranges bruise easily; this makes them vulnerable to mold Handle carefully
- Do not drop; toss, roll

Basic Info

- Should be firm with a consistent color
- Discard fruit that has a torn peel or that is bruised heavily

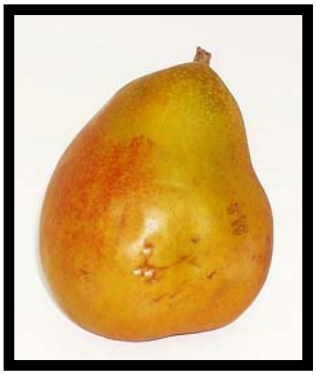
Pear

YES	NO	
☑	☐	REFRIGERATION
☑	☐	TEMPERATURE -1-0°C (30-32°F)

GOOD

Storage/Display

- Do not stack
- Sensitive to ethylene; Keep away from moderate to high ethylene producing fruit/vegetables
- Separate from heavier items
- Display stem up to prevent bruising



BAD

Handling

- Pears bruise easily; Handle carefully
- Do not drop; toss, roll

Basic Info

- There should be no cuts to the skin; slight blemishes are ok

Pineapple

YES	NO	
☐	☑	REFRIGERATION
☑	☐	TEMPERATURE 7-10°C (45-50°F)

GOOD

BAD

Storage/Display

- Do not stack
- Keep out of damp boxes; This can cause mold and decay
- Separate from heavier items

Handling

- Pineapples bruise easily; Handle carefully
- Bruising can lead to soft spots; leakage can occur
- Do not drop; toss, roll

Basic Info

- Pineapples are picked when ripe
- Top Green Leaves = Healthy
- Top Brown Leaves = Unhealthy

Packaged Cut Lettuce

YES	NO	
☑	☐	REFRIGERATION
☑	☐	TEMPERATURE 0°C (32° F)

GOOD

BAD

Storage/Display

- Must be kept cool at ALL times; especially upon receiving
- Keep refrigerated; Do not freeze
- Separate from heavier items
- Sensitive to ethylene; Keep away from moderate to high ethylene producing fruit/vegetables

Handling

- Handle carefully
- Do not drop; toss
- Do not puncture bag

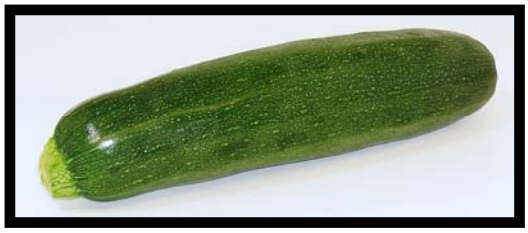
Basic Info

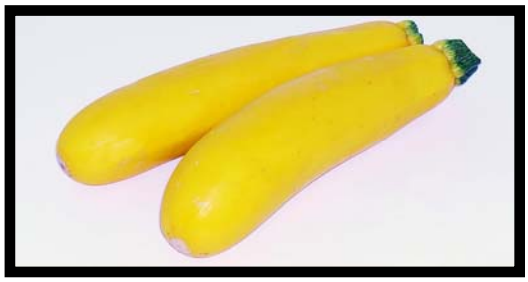
- Packaged lettuce goes bad faster than regular heads of lettuce
- Discard if majority of pieces are brown and wilted

Squash

(Includes Zucchini)

YES	NO	
☑	☐	**REFRIGERATION**
☑	☐	**TEMPERATURE 5-10°C (41-50°F)**

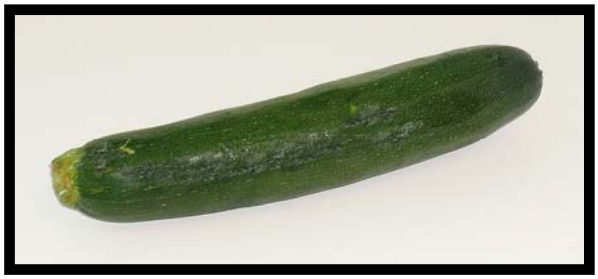




GOOD

Storage/Display

- **Rapid cooling recommended upon arrival**
- **Loss of moisture/water loss can lead to shriveling**
- **Sensitive to ethylene; Keep away from moderate to high ethylene producing fruit/vegetables**
- **Separate from heavier items**



BAD

Handling

- **Squash bruises easily; Handle carefully**
- **Do not drop; toss, roll**

Basic Info

- **Should be firm with a consistent, glossy color**
- **Squash has a very thin skin; It can break easily**
- **Highly perishable commodity**

Tomatillo

YES	NO	
☑	☐	REFRIGERATION
☑	☐	TEMPERATURE 5-10°C (41-50°F)

GOOD

BAD

Storage/Display

- Do not stack
- Separate from heavier items
- Rapid cooling recommended upon arrival
- Loss of moisture/water loss can lead to shriveling of the husk

Handling

- Tomatillos may bruise; Handle carefully
- Do not drop; toss, roll

Basic Info

- Should be free from decay and firm to the touch
- Husks can dry out, but fruit may still in good condition

Tomato

YES	NO	
☑	☐	REFRIGERATION
☑	☐	TEMPERATURE 7-10°C (44-50°F)

GOOD

BAD

Storage/Display

- Do not stack
- Sensitive to ethylene; Keep away from moderate to high ethylene producing fruit/vegetables
- Separate from heavier items
- Store and display stem up to prevent bruising
- Do not overload display

Handling

- Tomatoes bruise easily; Handle carefully
- Do not drop; toss, roll

Basic Info

- Should be well formed, firm, with uniform color; no "green shoulders"
- Discard tomatoes with cuts and broken skin

Watermelon

YES	NO	
☐	☑	REFRIGERATION
☑	☐	TEMPERATURE 10-15°C (50-59°F)

GOOD

BAD

Storage/Display

- Do not stack
- Sensitive to ethylene; Keep away from moderate to high ethylene producing fruit/vegetables
- Separate from items that may cause bruising

Handling

- Handle carefully; Watermelons bruise easily
- Do not drop; toss, roll

Basic Info

- Should be firm, free from cracks, soft spots, and symmetrical